THE PRINCIPLES OF TACTICAL ORGANIZATION AND THEIR IMPACT ON FORCE DESIGN IN THE US ARMY

by

MAJOR GLENN M. HARNED
U.S. ARMY

SCHOOL OF ADVANCED MILITARY STUDIES
U.S. ARMY COMMAND AND GENERAL STAFF COLLEGE
FORT LEAVENWORTH, KANSAS 66027

2 DECEMBER 1985

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE

AD-A162202

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION / AVAILABILITY OF REPORT APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED.
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S)	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION School of Advanced Military Studies US ARMY COMMAND AND GENERAL STAFF COLLEGE 6b. OFFICE SYMBOL (If applicable) ATZL ~~SMD-GD~~ SAV	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State, and ZIP Code) FORT LEAVENWORTH, KANSAS 66027-6900	7b. ADDRESS (City, State, and ZIP Code)
8a. NAME OF FUNDING / SPONSORING ORGANIZATION 8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State, and ZIP Code)	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. / PROJECT NO. / TASK NO. / WORK UNIT ACCESSION NO.

11. TITLE (Include Security Classification)
THE PRINCIPLES OF TACTICAL ORGANIZATION AND THEIR IMPACT ON FORCE DESIGN IN THE US ARMY

12. PERSONAL AUTHOR(S)
HARNED, GLENN M., MAJ, US ARMY

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
MONOGRAPH	FROM _____ TO _____	1985, DECEMBER, 02	50

16. SUPPLEMENTARY NOTATION

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	FORCE DESIGN, PRINCIPLES OF WAR, MILITARY ORGANIZATION, MILITARY THEORY.

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

This study investigates the nature of the theoretical principles that govern military organization, seeks to identify those principles, and then applies them to determine how best to design tactical organizations. To test its hypothesis that such theoretical principles do exist, the study examines the existing theory of tactical organization and analyzes the various force design options that the US Army has adopted since World War II.

The study concludes that two fundamental principles govern tactical organization -- economy of force and unity of effort -- and that the US Army misinterprets both these principles. From these two fundamental principles, the study postulates and defines five subordinate principles -- flexibility, integration, standardization, resiliancy, and continuity -- and derives from them a list of organizational imperatives for the force design process.

The study also concludes that the US Army does not have, but desparately needs, a formal doctrine for force design. It argues that the US Army currently relies on individual

20. DISTRIBUTION / AVAILABILITY OF ABSTRACT	21. ABSTRACT SECURITY CLASSIFICATION
☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS	UNCLASSIFIED
22a. NAME OF RESPONSIBLE INDIVIDUAL Maj Glenn M. Harned	22b. TELEPHONE (Include Area Code) 913-684-3345
	22c. OFFICE SYMBOL ATZL-SAV

DD FORM 1473, 84 MAR

83 APR edition may be used until exhausted.
All other editions are obsolete.

SECURITY CLASSIFICATION OF THIS PAGE

UNCLASSIFIED

BLOCK 19 (CONT):
interpretations of the World War II McNair philosophy of streamlining and pooling, despite the fact that changes in conditions have rendered that philosophy even more deficient than it was at the time of its formulation.

cont. The study identifies several major force design issues that remain unresolved in the US Army today, and provides some possible solutions to those issues for further evaluation. Among these issues is the question of whether the Army should adopt a "skip echelon" force structure that alternates units of maneuver and units of concentration at both the tactical and operational levels. Another issue centers on the organizational implications of the Army's evolving operational concept for the reintroduction of the tactical corps and the operational field army. The final issue is the fundamental dilemma of the Army of Excellence -- its organizational emphasis on austerity and flexibility conflicts with the Army's new operational emphasis on agility and responsiveness.

THE PRINCIPLES OF TACTICAL ORGANIZATION AND THEIR IMPACT ON FORCE DESIGN IN THE US ARMY

by

MAJOR GLENN M. HARNED
U.S. ARMY

SCHOOL OF ADVANCED MILITARY STUDIES
U.S. ARMY COMMAND AND GENERAL STAFF COLLEGE
FORT LEAVENWORTH, KANSAS 66027

2 DECEMBER 1985

86-2188

School of Advanced Military Studies
Monograph Approval

Name of Student: Maj Glenn M. Harned, U.S.A.
Title Of Monograph: The Principles of Tactical Organization and Their Impact on Force Design in the U.S. Army

Approved by:

Kenneth G. Carlson
LTC Kenneth G. Carlson, M.P.A., Seminar Leader

Richard Hart Sinnreich
COL Richard Hart Sinnreich, M.A., Director, School of Advanced Military Studies

Accepted this 31st day of December 1985 by:

Philip J. Brookes
Philip J. Brookes, Ph.D., Director, Graduate Degree Programs

The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other government agency.

ABSTRACT

THE PRINCIPLES OF TACTICAL ORGANIZATION AND THEIR IMPACT ON FORCE DESIGN IN THE US ARMY by Major Glenn M. Harned, USA, 50 pages.

This study investigates the nature of the theoretical principles that govern military organization, seeks to identify those principles, and then applies them to determine how best to design tactical organizations. To test its hypothesis that such theoretical principles do exist, the study examines the existing theory of tactical organization and analyzes the various force design options that the US Army has adopted since World War II.

The study concludes that two fundamental principles govern tactical organization -- economy of force and unity of effort -- and that the US Army misinterprets both these principles. From these two fundamental principles, the study postulates and defines five subordinate principles -- flexibility, integration, standardization, resiliancy, and continuity -- and derives from them a list of organizational imperatives for the force design process.

The study also concludes that the US Army does not have, but desparately needs, a formal doctrine for force design. It argues that the US Army currently relies on individual interpretations of the World War II McNair philosophy of streamlining and pooling, despite the fact that changes in conditions have rendered that philosophy even more deficient than it was at the time of its formulation.

The study also identifies several major force design issues that remain unresolved in the US Army today, and provides some possible solutions to those issues for further evaluation. Among these issues is the question of whether the Army should adopt a "skip echelon" force structure that alternates units of maneuver and units of concentration at both the tactical and operational levels. Another issue centers on the organizational implications of the Army's evolving operational concept for the reintroduction of tactical corps and operational field armies. The final issue is the fundamental dilemma of the Army of Excellence -- its organizational emphasis on austerity and flexibility conflicts with the Army's new operational emphasis on agility and responsiveness.

TABLE OF CONTENTS

INTRODUCTION

Background

In the first twenty years that followed World War II, the US Army redesigned its tactical force structure only twice. In the mid-1950s the pentomic division replaced the triangular division in a brief and unsuccessful attempt to organize for tactical nuclear warfare. In the early 1960s the ROAD division replaced the pentomic division, but the ROAD division was really nothing more than a return to the light armored division design of World War II, applied across the board to all types of Army divisions

In contrast to the continuity and evolutionary change experienced from 1945 to 1975, the last ten years of the Army's history has seen almost constant organizational turmoil. There has been a series of force design studies and experiments -- the Division Restructuring Study, Army 86, and now the Army of Excellence. In each case, personality prevailed. In the absence of any doctrinal guidance for force design, the senior general officer involved in the study had no choice but to provide the study group with his own personal concept of how the army in the field should organize to fight. Those who opposed the resulting organizational concept usually did so on the basis of their own personal beliefs concerning Army force design, not on theoretical or doctrinal grounds.

The Army has still not published any doctrine for force design, nor has there been any recent theoretical study of the subject. It is time for the Army to determine if there is a better method to design its force.

Scope

This study begins with the working hypothesis that certain fundamental principles govern military organization, just as fundamental principles govern the conduct of war. It assumes that such principles do exist, seeks to identify them, and then applies them to determine how best to design tactical organizations. In the search to test this working hypothesis, the monograph examines the existing theory of tactical organization and analyzes the various force design options that the US Army has adopted since World War II. Based on these findings, the conclusions address the validity of the working

hypothesis and the nature of the principles that govern tactical organization. The monograph closes by presenting some unresolved force design issues for further study.

Definitions

Two definitions are critical to the subject of this study. Force Design is the process of determining the proper internal composition of a unit, in order to develop a unit capable of accomplishing its battlefield functions. The product of the force design process is a Table of Organization and Equipment (TOE). Force Structure is the process of integrating the proper number and mix of TOE units into a balanced force capable of accomplishing its missions. The product of the force structure process is the Total Army Troop List. (1)

Significance

The significance of this study lies in the nature and purpose of tactical organization. The tactical organization of an army has a profound effect on its ability to wage war. If an army can organize properly to fight according to its doctrine, it will reduce friction, achieve greater unity of effort, and consequently expend its combat power more effectively. Such an army is more likely to achieve its military objectives and thus facilitate attainment of the political object of the war.

Major (later Colonel) E.S. Johnston was perhaps the greatest military theoretician of the US Army during the interwar years. In 1936 the Review of Military Literature published his classic "Field Regulations of the Future", which outlined his proposals for a new operational and organizational doctrine for the US Army. Johnston argued the importance of organizational doctrine and then discussed the principles of tactical organization. Referring to the US Army's Field Service Regulations of 1923, although he might as well have been speaking of its direct descendent, the 1985 draft FM 100-5, Operations, Johnston wrote that, despite the importance of tactical organization, "an officer of our army cannot go to Field Service Regulations -- the basic book on our doctrine for war -- and find a statement of the fundamentals of military organization." (2) As this monograph's

findings will demonstrate, the result of this doctrinal void has been the perpetuation of a force design process driven by personalities instead of principles.

FINDINGS

In the introduction, this study examined briefly the significance of tactical organization to successful military operations. In this section, it will probe more deeply into the theory and history of tactical organization.

E.S. Johnston

In his 1936 "Field Service Regulations of the Future", E.S. Johnston derived the theoretical foundation of tactical organization from two principles of war: unity of effort and economy of force. In an earlier work, "A Science of War" published in 1934, he wrote that the basic problem in war is to obtain unity of effort in the controlled application of protected combat power, in order to obtain an objective. (3) According to Johnston, "Control is regulation. Its purpose is to attain unity of effort for one's own forces, and to disrupt unity of effort in the enemy's." (4) This being the case, "The aim of the commander should be so to control the movement of protected combat power, as to place it in a location where the maximum results may be accomplished with a minimum expenditure of force." (5)

Unity of Effort

According to Johnston, "Organization is the mechanism of control. Its purpose, therefore, is unity of effort." (6) Thus, tactical organization is a mechanism of control, which produces unity of effort, which results in the economic expenditure of combat power. In the 1923 Field Service Regulations, as in FM 100-5 today, the US Army recognized Unity of Command as a principle of war, but Johnston argued that the principle should be Unity of Effort, not Unity of Command. He wrote,

> Wellington and Blucher [at Waterloo] succeeded by reason of cooperation; they had no unified command ... Unity of command, then, is merely a method of obtaining unity of effort; cooperation is another method ... The real problem is where to provide for unity of command and where to depend on cooperation. (7)

Economy of Force

Economy of force is achieved when one accomplishes the maximum results with a minimum expenditure of force. A discussion of this principle is important because economy of force is a two-sided coin -- one can interpret it in two ways. By the first interpretation, the principle is output oriented -- and focuses on economical employment and effectiveness, on generating maximum combat power with a given set of resources. This is the interpretation Major General J.F.C. Fuller expressed in his fundamental law of war: the law of economy of force, or the "law of economic expenditure of force", which states,

> ... if two opponents face each other, and each possess an identical supply of force, the one who can make his force persist the longest must win, because ... the desired end will be achieved with the smallest expenditure of force. (8)

By the second interpretation, economy of force is input oriented -- and focuses on austerity and efficiency, on minimizing the resources devoted to generating a given quantity of combat power. The US Army adopted this interpretation sometime after WWII; it has been part of US Army doctrine since the 1949 Field Service Regulations. The new draft FM 100-5 explains economy of force with the imperative, "Allocate minimum essential combat power to secondary efforts" (9); there is no sense of economy of force being the fundamental principle from which others are derived, as Fuller, Johnston, and others used the term before WWII. This monograph adopts the first interpretation, using economy of force to mean the economic expenditure of force. By doing so, it recognizes that efficiency is necessary -- but not sufficient -- to a tactical organization being effective; a tactical organization's output determines its success on the battlefield, not its input.

Tactical Organization

In his 1936 "Field Service Regulations of the Future", E.S. Johnston advanced these principles of tactical organization: (10)

The effectiveness of any method of organization depends on unity of effort in control of the means available against the means opposed, under the conditions of the theater of action, with due regard to the consequences of failure, in order to accomplish the object.

The appropriate organization of any unit is determined by the object of the unit [what it is organized to do], the means available for organizing and equipping it, the opposition it will encounter, the characteristics of the theater of action, and the probable consequences of failure.

The basic or tabular organization merely provides a basis for necessary modifications [task organization]. The specific organization formed in each situation is an expression of the ability of the commander concerned.

Difficulties in determining the most appropriate organization are greatest when the unit may operate in widely-different theaters, against widely-varying enemies. Such a situation increases the need for a flexible basic organization, and for an understanding in the military profession at large as to how it may best be modified to meet particular situations.

Close-combat troops may be provided with support either organically, or by direct support or attachment. The tests as to whether a certain support agency should be included organically in a unit, or placed in a higher unit where it can be made available as needed, are as follows:

Is the agency used with such frequency as to make organic inclusion desirable?

Is it available in sufficient quantities to permit organic inclusion, or should it rather be pooled under higher echelons in order to facilitate its presence when and where most needed?

Can it be employed as effectively by the lower as by a higher echelon?

Subdivision

Johnston wrote, "Subdivision is necessary for control, and permits separation of units in the interests of maneuver ... experience will demonstrate a practical limit to the number of subdivisions which, under given circumstances, can be controlled

by one leader. These considerations fix the [maximum] number of men in the smallest unit, and the [maximum] number of subdivisions in higher units." Johnston argued that there are comparative advantages and disadvantages to subdividing close-combat units into two, three, or four parts. Two subdivisions provide one to fix and one to maneuver, while three also provide a reserve. "Four subdivisions provide an organization yet more flexible, there being sufficient elements to maneuver around both flanks as well as for fixing and for the reserve. This organization is also useful in penetrations, in which case the entire unit may be used in a deep narrow column, in a square or similar figure, or in a T-shaped formation. A unit of four subdivisions is particularly flexible [because] the four subunits may be combined into three or two, according to the situation and the ability of the commander." A unit with four subdivisions is also more economical, requiring little more overhead than a unit with only three. (11)

Johnston also argued that the anticipated level of training at each echelon influences the number of subdivisions it can control. He wrote,

> In a great war requiring much expansion of the peace-time army, the training of junior leaders may be low, and casualties may keep it low ... Each echelon should be allotted the maximum number of subdivisions, within the total desirable for its typical operations, which it is estimated that its typical leader will be able to handle efficiently, and which other factors will permit. Conditions in this respect may vary from war to war, and within wars. (12)

Leslie J. McNair

While E.S. Johnston may have been the greatest interwar theoretician in the US Army, the most influential force designer of the period was Brigadier General (later Lieutenant General) Leslie J. McNair, who commanded the 2d Division's 2d Field Artillery Brigade during the extensive field tests (1936-39) of the triangular infantry division. When McNair assumed command of Army Ground Forces (AGF) in March 1942, he continued to implement the organizational concepts that he developed during these tests. His concepts continue to influence Army force design even today.

Streamlining and Pooling

McNair's guiding principle was J.F.C. Fuller's and E.S. Johnston's principle of economy of force -- the economic expenditure of combat power. In his official history of WWII tactical organization, Robert R. Palmer wrote,

> The twin aspects of economy were streamlining and pooling. They were phases of the same organizational process. To streamline a unit meant to limit it organically to what it needed always, placing in pools what it needed only occasionally. A pool, in the sense here meant, was a mass of units of similar type kept under control of a higher headquarters for the reinforcement or servicing of lower commands, but not assigned to lower commands permanently and organically. Pooling occurred at all levels, from the GHQ reserve pools which reinforced armies down through army pools, corps pools, and division pools to the company pool, which, in the infantry, provided mortars and machine guns to reinforce rifle platoons. (13)

Under McNair's concept of streamlining and pooling, pooling occurred for three reasons. (14) First, combat requirements fluctuated from day to day, and the Army could not afford to organize all its units to meet peak loads. Not only would such an approach be wasteful of scarce resources and result in a great number of relatively idle or malutilized troops, but a truly self-contained tactical unit would be so immobile and unwieldy that it would be incapable of performing its mission under normal conditions.

Another reason for pooling was the range of weapons and the consequent potential for the massing of fires. For example, the range of 60mm company mortars exceeded the frontage of any single rifle platoon, and they were therefore most economically employed in company pools where their fires could be shifted, distributed, or concentrated along the entire company front. For similar reasons based on technical characteristics, 81mm mortars were best pooled at battalion level.

Differences in tactical mobility were the third reason for pooling. In the WWII infantry, for example, a rifle platoon contained no crew-served weapons that required continuous resupply of ammunition or served as a focus for hostile direct fire. A rifle company contained only hand-carried crew-served

weapons, while a rifle battalion contained heavy weapons that could be manhandled for several hundred yards. All infantry weapons requiring prime movers were pooled at the regimental level. Similarly, WWII service units that did not have the tactical mobility of the divisions were assigned to the field army. Divisions and corps could maneuver without regard to temporarily immobile service units. The field army, drawing on its pools, would send them new service units, leaving the old ones to clear themselves and wait for a new mission. (15)

McNair's AGF stressed streamlining and pooling,

> to obtain flexibility and economy, which were essentially the same since flexibility meant freedom to use personnel and equipment where they would produce the most effective results. The trend may be described as away from the idea of the type [fixed] force and toward the idea of the task force. In other words, it was away from the organic assignment of resources to large commands ... and toward variable or ad hoc assignments to commands tailor-made for specific missions ...The emphasis on attachment, the virtual disappearance of organic troops from the corps and army, and the confinement of organic troops of the division to a strictly defined minimum made necessary extensive pools of nondivisional units ... The whole Army became, so to speak, a GHQ reserve pool from which task forces could be formed -- whether they were called by this name ... or called more conventionally corps or armies. (16)

McNair's Opposition

Streamlining and pooling provided for economy, mobility, flexibliity, and the capacity for massed employment, but not without cost. A primary disadvantage was the dependence of tactical commanders on the attachment of support units their higher commanders could not always provide. Another disadvantage was that commanders found it difficult to integrate temporary attachments and thus create cohesive combat teams. "There was therefore much disagreement on many particulars of organization; nor was it possible, with difficulties so fundamental, to find a permanent solution which all would accept." (17) As Palmer noted,

> No one advocated waste, unwieldiness, or dispersion. Disagreement arose in the judgment of concrete cases ... In practice there were many obstacles to successful achievement of an economy of force ... General McNair resolutely set himself against such proliferation, which added nothing to the fighting strength of the Army.(18)

In his drive for economy of force, McNair focused on how other arms supported the infantry fight, not on how to integrate all the arms into a combined arms operation. (19) That viewpoint was not shared by Lieutenant General Jacob L. Devers, one of the leading dissenters against the excesses of McNair's "economy of force" school. In August 1941 Devers took over as Chief of the Armored Force with the specific mission of settling the cavalry versus infantry arguments in the new arm (Devers, like McNair, was an artilleryman) and devising a combined arms approach to armored warfare. Devers emphasized the complementary effects of combined arms in the armored division, and questioned the length to which McNair carried the pooling principle. Palmer wrote, "He [Devers] held that occasional attachment of nonorganic units to divisions would produce poor combined training and poor battlefield teamwork, and that it was a doubtful way of achieving either unity of command or economy of force." Devers argued in a letter to General Marshall:

> Economy of force is not gained by having a lot of units in a reserve pool where they train individually, knowing little or nothing of the units they are going to fight with. It is much better to make them part of a division or corps, even to the wearing of the same shoulder patch. If they are needed elsewhere in an emergency, they can be withdrawn easily from the division or corps and attached where they are needed. Economy of force and unity of command go together. You get little of either if you get a lot of attached units at the last moment. Team play comes only with practice. (20)

Austerity

As Palmer wrote, "The advent of war and the need of conducting operations on the far side of oceans brought to light a paradox by no means new in military history, namely that armies may be immobilized by their own means of transportation." (21) The Army's prewar motorization program increased its shipping requirements and thereby reduced the rate at which units could deploy overseas. In September 1942 General Marshall wrote to McNair that the Army's divisional motor transportation was extravagant. McNair's reply addressed the broader issue of tactical organization:

> The present regrettable excess of motor transportation is due to chiefs of arms and services seeking heavily and thinking narrowly, to field commanders who seek to make their units too self-contained, and to an over-indulgent War Department. It is futile now to exhort the same agencies as brought about the existing condition. It is believed that the remedy is one or a group of no-men ... Such a person or group will cause loud complaints from the field, and conceivably can go too far in its efforts to economize in transportation. Nevertheless, drastic countermeasures are necessary to correct present conditions, and the War Department must empower such an agency to go into all kinds of units, and back up its findings. (22)

Marshall turned to McNair to be his "No-Man". In October 1942, McNair created an AGF Reduction Board and instructed it to cut AGF by 20 percent in motor transport and 15 percent in personnel, "without lessening the combat strength of any unit or upsetting the doctrine of its tactical employment." (23) In the eight months of its life, the Board reviewed the whole theory of army and corps organization. The Board assumed that no unit smaller than a field army could be made self-sufficient and that units would be made sufficient for particular missions through attachment. To facilitate these attachments, the Board abolished the fixed nondivisional regiment and organized practically all nondivisional units as separate battalions and companies placed under flexible groups and brigades of groups. By abolishing the fixed nondivisional regiment, McNair's Reduction Board eliminated as well the concept of a type army or corps with organic units.

New TOEs were issued for most AGF units in July 1943, despite "loud complaints from the field" and the ensuing discussions and compromises. (24) However, McNair never had authority over the units of the Army Air Forces or of the service units of the Services of Supply. Only those units intended for the combat zone came within his reach. This fact becomes significant when one realizes that while the strength of the US armed forces reached 12,350,000 in WWII, and the Army 8,290,000, the strength of Army Ground Forces never exceeded 2,700,000. Consequently, McNair accomplished his reductions in the very units that, being the closest to combat, most needed the resiliency or staying power that McNair's reductions eliminated.

After the 1943 reorganization by McNair's Reduction Board, "a reaction set in against the extreme emphasis on flexibility and economy." (25) The new force design increased the combat power delivered overseas, reduced the resupply problems of overseas commanders, and made forces more compact and maneuverable on paper, but not without

> stresses and strains at the organizational level. While the fundamental TOEs remained substantially unchanged for the remainder of the war, piecemeal TOE augmentation began to swing the pendulum in the opposite direction ... In practice, field armies and corps never had enough units in their pools to satisfy the demands of the divisions -- after all, Army Ground Forces was having trouble manning divisions -- and infantry divisions commonly received tank, tank destroyer, antiaircraft and engineer battalions in permanent attachment. (26)

Military historian Jonathan House concurs with Palmer's assessment, writing,

> When the US Army finally employed these [McNair's] concepts overseas, they proved only partially successful. Regardless of the terrain or enemy involved, most divisions in Europe and many in the Pacific believed that they needed tank, antiaircraft, tank destroyer (antitank), and nondivisional engineer support in virtually all circumstances. Corps and field army commanders who followed doctrine by shifting these nondivisional units from division to division according to the situation found that they could maximize the use of such elements only at the cost of much confusion and inefficiency. Attachment to a different division meant dealing with a different set of procedures and personalities before the attached units could mesh smoothly with that division. Once such a smooth relationship was established, the division was reluctant to release its attachments as ordered. In many instances, tactical commanders found it expedient to leave the same nondivisional elements attached to the same divisions on a habitual basis that might last for months ... Thus, the triangular division in combat was much larger, more rigid, and more motorized than McNair had envisioned. An augmented infantry division of this kind might well have the mobility and firepower of a motorized division or even an understrength armored division. (27)

In effect, Devers was vindicated in his objections to the McNair austerity drive. Significantly, and perhaps not coincidentally, Devers returned from his army group command in

July 1945 to assume command of AGF and guide the postwar organization and training of the Army. In November 1946, less than eighteen months after General Devers assumed command of AGF, the Army approved a new force design for the infantry division. The new infantry division was larger, more powerful, more mobile, and more self-sufficient than the one authorized in 1943. It was also fully triangularized, and thus facilitated the formation of task-organized regimental combat teams (RCTs) and battalion task forces to perform specific combat missions. This postwar infantry division "withstood the test of Korea ... The RCTS often controlled as many as five or six battalions of armor or infantry and were fought with the flexibility of combat command organizations." (28)

CGSC CDD Study 56-10

After the Korean War, the Army realized that it would have to "develop a doctrine and organization that would allow ground forces to function effectively on a nuclear battlefield." (29) While commanding the US VII Corps in Germany, Lieutenant General James M. Gavin discovered during exercises that the infantry division could not adopt to the nuclear battlefield, and concluded that it was necessary to redesign the infantry divison into relatively autonomous and widely dispersed battle groups, each one capable of independent sustained combat. General Maxwell D. Taylor wanted to make tactical units "sufficiently small so that they would not present a lucrative nuclear target, sufficiently balanced between the arms so that they could defend themselves when isolated, and sufficiently self-supporting that they could fight without vulnerable logistical tails ... also wanted to streamline the command structure in order to speed the passage of information and decisions." (30)

In April 1956 the Continental Army Command tasked the Army Command and General Staff College to examine the relative merits of small versus large divisions. The tasking letter contained the following DA staff comments:

> The Staff considers that any comparison of small versus large divisions is largely academic since ... the combat capability of the small division may be generally comparable to the combat capability of a subordinate unit (regiment, combat command, etc.) of the large division appropriately supported. Conversely, the large division with appropriate support may be comparable to a corps of small divisions. In summary ... the same relative size organization can have approximately the same combat capability regardless of the name applied to the organization. The basic problem is to consider whether we determine the desired role of future divisions and then develop organizations and weapons and equipment to enable divisions to best fill those roles, or conversely, whether we develop divisions based on present concepts of size and organization and then determine what roles these divisions can fill. The Staff considers that the Army must adopt the first approach. (31)

CGSC Study 56-10 begins by defining the small division as "one in which the basic maneuver elements are directly subordinate to the division headquarters" and the large division as "one in which a regimental/ combat command echelon is interposed between the basic maneuver elements and the division headquarters." (32) The study includes an excellent discussion of organizational principles. Among its major points are the following: (33)

* On responsiveness: "A large division can react with the necessary rapidity to a given situation as well as a small division." The study noted, "It is considered to be a faulty line of reasoning to argue that battalions cannot react as rapidly to the division commander's wishes -- nor can he react as rapidly to their needs -- if there is a combat command echelon. If there is a combat command echelon, it is at this level that immediate decisions with regard to the battalions are made. If the division commander is to take over the tactical role of the combat command/ regimental commander, then the corps commander must take over the tactical role of the division commander." The study argued,

> There is a difference between controlling a large number of maneuvering elements which may be roughly in line and heading in the same general direction [the combat command/regimental commander's role], and controlling the same number of elements which may have considerably different parts to play in achieving a common goal [the division commander's role]. If a

> [division] commander takes over directly the command over battalions, he takes over at least the degree of detail which goes with command of a regiment; and more if a corresponding complement of divisional support means is given him as well. This degree of detail has the effect of absorbing his attention and limiting the width and depth of the area he can personally cover properly, in a similar manner as the number of battalions available limits this area ... such a commander must remain a regimental or combat command commander regardless of the designation which may be given this unit. (34)

* On subdivision and span of control: "No adequate substitute has been devised for a commander's personal visit to subordinate elements and his personal influence at the critical point in battle. The number of subordinate elements normally assigned a commander must be less than the saturation point to permit adequate control of reinforcing elements in battle. Many wartime comanders will lack the experience required to exercise command adequately over an increased number of elements. Thus, the number of subordinate maneuver elements should not exceed four and in some cases three are desirable." The study argued that a large division, with three regiments and ten battalions controlling thirty maneuver companies, is easier to control than a small division, with five battle groups and one tank batalion controlling thirty maneuver companies, because there are twice as many intermediate headquarters exercising control.

* On flexibility: 'Organizational structure, equipment, doctrines and techniques are the basis of flexibility, rather than sizes of units. Divisions organized on the combat command principle, and with sufficient strength, can perform countless combinations to meet practically any situation. The more the various elements of a division are combined into fixed organizations, or the fewer the basic elements which can be combined into teams, the less flexible the division becomes."

* On mobility: "there is no significant difference in the strategic or tactical mobility of a force composed of large or small divisions." (35) This study recognized what the Army of Excellence does not: that if less than one large division is required to meet a contingency, then that large division can be strategically tailored to meet that specific contingency. For contingencies requiring more than one large division, it is

irrelevant whether we send a corps of large divisions or of small divisions augmented by corps assets. The same amount of combat power requires the same amount of lift, regardless of the patch on the soldiers' left sleeve. Large divisions, because they can pool certain general support assets, may in fact require less lift than smaller ones.

* On combined arms integration: The study recommended that the basic maneuver element be only as administratively self-sufficient as the nondivisional separate battalion, that other divisional support elements not be fragmented, that the regimental echelon be retained as a flexible combat command, and that the span of control be four battalions per combat command, and three combat commands per division. (36) In other words, the study essentially recommended the adoption of what became known as the ROAD concept.

Despite this study, the Army adopted the pentomic division in 1957. The intent of the force designers was to eliminate the battalion level of command and to base the division on five integrated combined arms battle groups that functioned as regiments but directly controlled companies; in fact the battle groups proved to be nothing more than oversized and unwieldy battalions. (37) Just as CGSC Study 56-10 predicted, "if the system of direct support is overly integrated into the structure of the supported units, regardless of the size of the division, the flexibility and cohesiveness ... upon which the success of the division as a whole is predicated may be fatally handicapped by the inability of a single [division] commander to control that support and concentrate it at a critical time and place. Integrating it at the maneuver unit level certainly reduces flexibility." (38)

The pentomic structure was never extended to the armored division. It retained its three combat command, four tank and four armored infantry battalion, design with only minor change. In the end, its inherent flexibility was extended to the entire force structure as the ROAD Division concept.

The ROAD Concept

The Army was not happy with the pentomic division. In 1961, the new Kennedy Administration quickly approved the Army's ongoing ROAD (Reorganization Objectives Army Division) Study. The ROAD Division signalled a move by the whole army in the field to the organizational design of the WWII light armored division. The new division's principal design characteristic was its flexibility -- it could be tailored at any level to task organize for any particular situation. House wrote:

> Strategically, the army could choose to form and deploy armored, mechanized, conventional infantry, airborne, and later airmobile divisions, depending upon the expected threat. Although there were recommended configurations of each division type, in practice planners could further tailor these different division types by assigning various numbers and mixes of armored, mechanized infantry, infantry, airborne infantry, and airmobile infantry battalions, for a total of anywhere from seven to fifteen maneuver battalions. The division commander and staff had considerable flexibility in attaching these battalions to the three brigade headquarters. Finally, within the brigades and battalions, commanders could task organize combined arms forces by temporarily cross-attaching infantry, mechanized, and armored companies and platoons, as well as attaching engineers, air defense artillery, and other elements. (39)

In theory, the ROAD brigade echelon was a purely tactical headquarters to control the training and operations of attached combat battalions. The result was maximum tactical flexibility, but at the expense of the combined arms cohesion found in a fixed regiment or battle group. To minimize the integration problems associated with the pooling of support assets at division level, ROAD commanders routinely employed the concept of habitual association to keep the same units together as a combined arms team, unless a radical change of mission or terrain forced a change, just as commanders had done with attachments in WWII and Korea. In practice, the ROAD brigade commander never considered himself purely a tactical commander, and exercised some degree of control over all important matters in his command, just as the armored division combat command commander had done previously. The ROAD force design gave the US Army the span of control and flexibility of organization it had lacked with the pentomic

concept. Habitual association provided an acceptable degree of cohesion, responsiveness and battlefield agility, solving the problem of combined arms integration that this organizational flexibility would have otherwise hindered. The Army fought the Indochina War with the ROAD division, but that war was not a true test of the division's capabilities because it did not involve a great deal of maneuver above brigade level.

The Echelons Above Division (EAD) Study

Before the 1970 EAD Study, the Army considered the corps to be a purely tactical echelon that worked for a field army with both tactical and administrative responsibilities. The field army controlled a consolidated combat zone logistical system -- the Field Army Support Command (FASCOM) -- that largely bypassed the corps and dealt directly with divisions. The Army could not justify this headquarters overhead in peacetime, so in 1972 it eliminated the tactical corps echelon and substituted the independent corps, a corps-size field army with its own combat zone logistical system -- the Corps Support Command (COSCOM).

To fill the doctrinal void created by the elimination of the tactical corps, the Army began to redesign the division echelon as a division-size corps with the deep attack and counterfire missions that corps used to perform. Predictably, these changes adversely affected the agility of both the corps and the division. Dissatisfaction with this loss of agility led not to the return of the tactical corps, but rather to a decade of organizational initiatives that have now taken the Army almost full circle. Unfortunately, these initiatives have not been guided by any set of theoretical principles, such as those argued by E.S. Johnston, by Generals McNair and Devers, and by CGSC Study 56-10. Instead, senior general officers have provided force designers with lists of organizational guidelines, without reference to the fundamental principles that led to those guidelines. The result, as this monograph will show, has been organizational chaos.

Army 86

General Donn A. Starry initiated the Army 86 study projects in September 1978, about one year after assuming command of the US Army Training and Doctrine Command (TRADOC). The studies had their origin in the Division Restructuring Study (DRS) begun by his predecessor, General William E. Depuy. Based on his analysis of the 1973 Middle East War, Depuy believed the ROAD Division "could no longer harness efficiently the combat power of the weaponry of the 1970s, not to speak of the awesome potential of the new material programmed to arrive in the decade ahead." (40) In March 1976, at the urging of DePuy, HQDA directed TRADOC to undertake a division restructuring study [actually a force design study], and that July the TRADOC planners presented their concept for a redesigned heavy division. The proposed heavy division had three fixed heavy brigades, each with five small tank and mechanized battalions designed to integrate the combined arms actions of small, single-purpose companies. In January 1977 General Bernard W. Rogers, then Army Chief of Staff, approved the DRS concept for field testing. The Division Restructuring Evaluation (DRE), conducted from February 1977 to October 1978 by the 1st Cavalry Division at Fort Hood, Texas, revealed that the DRS design was flawed -- the division proved too fragile for sustained combat in a NATO scenario. (41) Nevertheless, the DRE results provided an excellent data base that TRADOC incorporated into the broader framework of Division 86, the first of the Army 86 studies.

Division 86

The Division 86 study began with a new and radically different conceptual approach. General Starry believed that operational concepts should drive the Army. For this to happen, however, the Army had to share a common vision of where it was going and why, of what needed to be done to get from its present state to where it wanted to be in the future. Starry directed his TRADOC planners to develop a Battlefield Development Plan (BDP) to provide such a unifying vision to the Army.

Based on his experience as V Corps commander in Europe, Starry brought to TRADOC his concepts of the "central battle" -- that part of the battlefield where all the combat systems and combat support systems interact to produce a decisive action --

and of "force generation" -- which encompassed the anticipation of central battles, the concentration of combat power at the decisive time and place in order to win them, and the disruption of the enemy's ability to do the same thing. (42) When the BDP was first published in November 1978, it explained the central battle and force generation, and identified ten critical battlefield tasks. As the Division 86 study progressed, the division of the ten tasks between central battle and force generation proved artificial and all the critical battlefield tasks became separate battlefield functions. By December 1979 TRADOC recognized the ten following battlefield functions: target servicing, suppression-counterfire, interdiction, air defense, mobility-countermobility-survivability, battle support, reconstitution, command-control-communications and electronic warfare, intelligence-surveillance and target acquisition, and force movement. (43) The Combined Arms Center (CAC) at Fort Leavenworth was the integrating center responsible for insuring that the force designers balanced all these functions to create tactical organizations that could accomplish the missions envisioned for them in the TRADOC operational concept.

Meanwhile, in October 1978 General Starry established a set of guidelines for the Army 86 force design process. (44) These directed that TRADOC:

* Integrate weapons systems in organizations to maximize firepower forward, enable combined arms forces to maneuver and concentrate quickly, and provide essential leadership and command control forward.

* Reduce and simplify tactical, technical, and training responsibilities at all echelons.

* Provide for effective combined arms integration, especially at battalion and brigade level.

* Provide for effective integration of the air-land battle, especially at division and corps level.

* Improve tactical nuclear and chemical capabilities.

* Develop redundancy for critical control functions and key combat tasks.

TRADOC historian John L. Romjue wrote, "It was clear from the outset that Division 86 was to be not only a project to define and develop the new heavy division, but a process to institute periodic force review and the design and fielding of major division components. It would involve the TRADOC integrating centers, schools, and activities intensively, with task forces established in line with the battlefield functions of the BDP. In this way, support and understanding for the new functional approach would be built." (45) As the Division 86 study progressed, so did work on the Army's operational doctrine. Starry's concept of the "extended battlefield" was refined into an operational concept that was the forerunner of current AirLand Battle doctrine. Still attrition rather than maneuver-oriented, this concept envisioned "an air-land battle whose tenets were the active defense to stop attack, disruption of follow-on echelons, protection of rear areas, and destruction of the enemy by offensive action." (46)

On 18 October 1979, the new Chief of Staff, General Edward C. Meyer, approved the heavy division in principle but withheld final approval until TRADOC briefed him on the results of the remaining Army 86 studies -- the light division, the corps, and echelons above corps. Both he and General Starry realized that Division 86 could not be fully understood in isolation from the remaining Army 86 studies because the designs of all the Army 86 echelons were interdependent. On 1 August 1980, General Meyer approved a heavy division that numbered 19,966 with six armor and four mechanized infantry battalions, and 20,250 with a five/five mix. This heavy division retained the inherent flexibility of the ROAD division, with a division base, "combat command"- like brigade headquarters, and a flexible number of maneuver battalions. With its new air cavalry attack brigade, larger division artillery and ground maneuver battalions and composite brigade support battalions, the division "embodied [Starry's] concepts of maximum firepower forward, improved command control, increased fire support and air defense, an improved combining of the arms, an increased leader-to-led ratio, and smaller, less complex fighting companies and platoons." (47)

Infantry Division 86

The history of the Army 86 light division study, Infantry Division 86, further clarifies the importance to force design of a clear and specific operational concept. There was no initial agreement on a mission and operational concept for the light division. In September 1979 Generals Meyer and Starry agreed on the stated purpose of developing light divisions with significantly increased firepower and tactical mobility, capable of worldwide commitment to contingencies and also of incorporation into heavy corps in an established theater (NATO). By March 1980 TRADOC planners had developed an interim operational concept, but the more the TRADOC planners worked to produce a lean, mobile, anti-armor force, the more they questioned the compatibility of the established force design requirements. In August 1980 General Meyer rejected the TRADOC planners' third design and released them from General Starry's original guidance that the light division would be "lightly manned but heavy in combat power." (48) Meyer stated that force packaging -- a modified pooling concept that provided specific capabilities at corps level for the dedicated support of subordinate divisions -- was not an acceptable substitute for designing the required capabilities into the division, and that required division capabilities should determine division size, not the other way around. (49) With this new guidance, the TRADOC planners quickly developed a fourth design that General Meyer approved for planning and testing on 18 September 1980. The 17,773-man Infantry Division 86 had a "foxhole strength" of 2,376 and was increased over the three earlier designs in "virtually all its major organizations. It was standardized to a degree with the heavy division. With 8 motorized infantry and 2 mobile protected gun battalions, it fielded the combat power to execute contingency operations and to conduct armor-delaying and other NATO missions." (50) This force design became the model for the 9th Infantry Division "High-Technology Testbed" at Fort Lewis, Washington.

Infantry Division 86 had "three sets of deployment requirements according to mission and phase of operations. These were employment against armor forces, contingency employment against light forces, and employment in assault. These were

measured out in terms of C-141 flights." (51) In other words, the division would be strategically tailored for a specific mission, after the decision to commit had been made, not during the force design process. This approach to strategic mobility coincided with the approach taken in CGSC Study 56-10 and under the ROAD concept. It was not the approach taken by the Army of Excellence.

The Army of Excellence

The Army of Excellence (AOE) study was undertaken "because the sum of the Army's required parts exceeded the resources available to structure the Army. Each component of the evolving Army structure was a sound, flexible organization; but when all of the personnel and material requirements for them were totaled, the requirements exceeded the army's ability to meet them." (52) During the August 1983 Army Commanders' Conference, senior Army leaders expressed their concerns that much of the Army had become a "hollow" force. For example, using the 48,000-soldier division force equivalent (DFE) method to determine personnel requirements, the 1983 24-division force required 1,152,000 soldiers to fill the Total Army force structure; this represented a shortfall of 153,300 soldiers when compared with the 998,700 spaces actually programed. This shortage manifested itself in units assigned multiple wartime missions, and in units manned at greatly reduced authorized levels of organization (ALO) to meet manpower constraints.

The AOE study also incorporated an earlier concern that had surfaced during the June 1983 Corps Commanders' Conference. The corps commanders felt the combat divisions were too powerful in comparison with the corps and too large and unwieldy to perform as the maneuver element of AirLand Battle. Although the corps commanders were responsible for execution of the corps operational plan, the Army 86 force designs allocated the bulk of the Army's combat power to the divisions. As a result, the corps commanders "lacked the capability to influence the battle. That was contrary to the concept of the corps as the centerpiece in the execution of AirLand Battle doctrine." (53)

General John A. Wickham, the new Chief of Staff, tasked TRADOC to address these concerns in a ten-week feasibility study. The Army Staff provided the following guidance: (54)

* Recommend designs that will not exceed the Army's programed personnel end strength. [For the first time, the Army intertwined the force structure and force design issues at TRADOC level. TRADOC now had to design organizations so that DA could afford to program a given number of each type unit.]

* Develop a light, division-size force optimized for rapid deployment for low intensity contingency missions. Recommend reductions in the size of the heavy division to increase its mobility; consider centralizing [pooling] assets at echelons above division [but without shifting responsibility for those assets' functions].

* Redesign corps and EAC structures to improve their warfighting capability.

The Study

Because the study was to be completed in ten weeks, the TRADOC force designers "compressed and accelerated" the concept based requirements system institutionalized under General Starry. (55) In his 1985 MMAS thesis, Major Raymond D. Barrett writes,

> Although four years were required from 1976-1980 to develop Division 86 from concept to an approved objective force design, the Army of Excellence's initial objective force designs, the Infantry Division (Light) and the Heavy Division, were completed in less than twelve weeks (30 Aug - 10 Nov 1983) ... in part by abandoning standard analytical procedures in favor of qualitative professional judgments, gamer insights, static measures of force effectiveness and results from previous studies of Army 86. (56)

Under AOE, General Wickham reintroduced McNair's concept of austere "streamlining and pooling", and directed that TRADOC use a force packaging concept to place specific division capabilities in the parent corps' force structure. This decision reversed General Meyer's Army 86 guidance that force packaging was not an adqeequate substitute for designing required capabilities into the divisions. TRADOC's proponent schools and integrating centers sliced more than 15 percent of the personnel

from the heavy division; to improve efficiency and minimize the impact of these personnel reductions, they incorporated some of the innovative features of the new light infantry division.

TRADOC completely redesigned the light infantry division. While Infantry Division 86 focused on the application of advanced technology to develop mounted light forces that would be effective in mid to high intensity conflict, the AOE Infantry Division (Light) focused on dismounted infantry combat in low intensity conflict. General Wickham placed ceilings on the light division's end strength (10,000) and strategic lift requirements (500 C-141 sorties), and these constraints replaced operational requirements as the major considerations of the design process.

To develop the corps and EAC structure for each theater, and still remain within General Wickham's manpower constraints, TRADOC established manpower planning ceilings for each theater and functional area. The TRADOC force planners then gave priority to increasing the number and mix of active combat units, and accepted greater risk in support functions by assigning more support units to the reserve components. As a result of these efforts, TRADOC developed an alternative force structure with all elements at "ALO 1", with each corps allocated to only one theater, and with each subordinate unit assigned to a specific corps or echelon above corps.

AOE proponents argue that, when considered in the total Army context, the AOE alternative force designs sacrificed some robustness and redundancy in order to reduce the high cost of combat forces and to make those combat forces agile enough to execute AirLand Battle. The designs supported the concept of the corps as the centerpiece for successful execution of AirLand Battle doctrine, by reallocating a greater share of the total combat power of the corps to the corps commander's direct control, so that he could better influence the battle and the execution of his operational plan. On paper, at least, they streamlined, balanced, and optimized the Army force structure, and eliminated hollowness by providing a total force fielded at "ALO 1". (57) However, if Army 86 designed an ALO 1 division organized for sustained heavy combat, and then AOE significantly reduced the size of that division without relieving it of any

functional responsibilities, AOE in fact redefined ALO based on manpower constraints rather than operational requirements. In many cases, the problem of the Active Army's hollowness was resolved by redefinition of ALO and reserve component roles. Hence this monograph's use of "ALO 1".

Adverse Reaction

The AOE caused in the field army an adverse reaction even greater than the one led by Devers against McNair in 1942-43. In their May 1985 article in the Armed Forces Journal, the pseudonymous Generals "Sam Damon" and "Ben Krisler" accused the AOE study of being "a search for operational justification for a political solution" to the Army's manpower problems. While conceding that AOE did realign the corps echelon to better support AirLand Battle doctrine, they objected to a force packaging concept that "hides the full cost of fielding light divisions and the true strategic mobility requirement." (58)

In a follow-on article in the November 1985 Armed Forces Journal, Brigadier General John C. Bahnsen argued, "The maneuver style of AirLand Battle and its balanced offense/defense flavor puts a premium on combined arms forces that can be rapidly concentrated -- an imperative not supported by the outdated ROAD notion [perpetuated by both Army 86 and AOE] of ad hoc task organizing at battalion and brigade." (60) He recommended that the Army move to a single type of heavy division and a single type of light division, each organized with fixed brigades of combined arms battalions.

AOE and AirLand Battle

In his 1985 MMAS thesis, Major Barrett examined in more detail the coherence between AirLand Battle requirements and AOE capabilities. In contrast to the Active Defense focus on maximum firepower forward under the tactical control of divisions, AirLand Battle focuses on the operational synchronization of maneuver and firepower by corps and echelons above corps. The tenets of AirLand Battle place two significant operational requirements on tactical organizations: the requirement for agility dictates that they be flexible and capable of rapid task organization, and the requirement for synchronization dictates

that they be responsive, self-contained combined arms formations. (60) These organizational capabilities are not easily combined in a single echelon of command.

Barrett argues that the two capabilities must be "built into alternate echelons, where one command echelon is a tailorable unit of concentration, possessing the flexibility" to rapidly "absorb, employ, and then release combat power," while the next is a self-contained unit of maneuver, "capable of exploiting transient opportunities without prior time-consuming augmentation." (61) He argues that the AOE force structure, while an improvement over Army 86, does not provide command echelons that are alternately fixed and flexible. At the operational level, field armies and army groups are flexible organizations. At the tactical-operational level, corps are also relatively flexible. As Barrett wrote,

> With a mix of armor, mechanized and light infantry divisions, two separate brigades, an armored cavalry regiment and a minimum of four artillery brigades, the corps represents a well-balanced and flexible organization. As a headquarters with its own service support, the corps can support force tailoring to meet the requirements of its mission. Yet under the design constraints of its subordinate divisions and brigades, the corps cannot easily or rapidly conduct force tailoring. (62)

To correct this perceived deficiency, Barrett proposes that the Army redesign the division as a tailorable [flexible] headquarters with the responsibility for planning and controlling the employment of tactical combat power organized into self-contained [fixed] brigades. Barrett writes,

> As the key tactical instrument of the corps, the division should be responsible for concentrating tactical combat power and employing it in concert with the corps plan. To do this it must be a flexible organization capable of accepting augmentation from corps and other divisions while rapidly massing and dispersing subordinate tactical formations. With its fixed structure and heavy support responsibilities, division does not possess the inherent flexibility to perform these functions. (63)

Under Barrett's proposal, the brigade would replace the division as the basic administrative and tactical combined arms organization of the Army. The brigade would become a balanced combined arms organization with enough organic fire support, reconnaissance, engineers, and service support to perform its close combat mission under whatever conditions the TRADOC operational concept defines as normal. The divisional combat aviation brigade and the corps artillery brigade would also receive organic CSS, and thus be available for rapid task organization without overwhelming the logistical system of the gaining unit -- like the ground maneuver brigades, they would simply pick up and move, then plug into the corps area support system after they arrive. Barrett did not address whether the Corps Support Command (COSCOM) is exible enough to handle this concept -- especially before the theater matures -- and the discussion of this question is beyond the scope of this study.

CONCLUSIONS

Organizational Principles

There are two fundamental principles that govern tactical organization: economy of force and unity of effort. From these two fundamental principles, one can postulate five subordinate principles: flexibility, integration, standardization, resiliency, and continuity. This section examines each of these principles, derives from them a list of organizational imperatives, and ends with a conclusion as to the proper methodology for force design.

Economy of Force

Economy of force refers to the expenditure of combat power in order to achieve the maximum results with a minimum expenditure of force. It is the fundamental principle from which other principles of war are derived, and it is the standard by which one should judge all tactical organizations. The application of this principle should be output oriented and focus on economical employment and effectiveness, on generating maximum combat power with a given set of resources. As Palmer wrote,

> Economy, properly understood, does not mean getting along with the least possible but getting the most out of what one has -- not a minimizing of effort, but a maximizing of results. General McNair hoped, by reducing the size of units, to make it possible to mobilize and ship a large number of units. He hoped also, by pooling and by flexible organization, to make every unit available for maximum employment at all times. By the close of 1942 it was evident to General McNair that every man, weapon, and ship-ton made available to the Ground Forces must be used to the utmost, at whatever strain to the individuals concerned, and that economy of ground forces was vital to winning the war. (64)

A similar realization by today's Army leadership led to the Army of Excellence. AOE pursues an austerity policy similar to the McNair reduction policy that was discredited in WWII combat. Austerity and force packaging, while economical in theory, did not work well in World War II, even under conditions of full mobilization. Austere units are even less economical in a "come as you are" war; more robust and thus more survivable units make sense when you plan to fight outnumbered and win, without benefit of unit rotation, instead of steamrolling your opponent with material superiority. Historically, austerity has led to the excessive application of streamlining and pooling, to the point that units lose their capability to perform their missions in sustained combat. Advocates of austerity recognize the program constraints of the US Army and weigh these "real world" constraints against the tendency by force designers to make every unit as self-sustaining as possible. The positive aspects of streamlining and pooling represent economy of force and result in flexibility. However, as General Meyer stated during the Infantry Division 86 study, functions and resources must coincide.

Unity of Effort

The purpose of tactical organization is to provide a flexible, agile and responsive command and control structure that facilitates unity of effort. Unity of effort results in the economic expenditure of combat power in the pursuit of a common objective. It is the product of the synchronization of combat power, and can be obtained either through unity of command or

through the use of cooperation and coordination. The force designers' dilemma is "where to provide for unity of command and where to depend on cooperation." (65) House writes,

> major armies have tended to integrate more and more arms and services at progressively lower levels of organization, in order to combine different capabilities of mobility, protection, and firepower while posing more complicated threats to enemy units. Integration does not necessarily mean combining individual weapons or even companies of different arms together in a permanent [combined arms] organizat on in garrison ... To be effective, [it is sufficient that] the different arms and services must train together at all times, changing task organization frequently. When making such changes in task organization, it is more effective to begin with a large combined-arms unit, such as a division or fixed brigade, and select elements of that unit to form a specific task force, rather than to start with a smaller brigade or division and attach nondivisional elements to that formation. In the former case, all elements of the resulting task force are accustomed [through habitual association] to working together and have a sense of unit identity that can overcome many misundertandings. In the latter case, confusion and delay may occur until the nondivisional attachments adjust to their new command relationships and the gaining headquarters learns the capabilities and limitations of these attachments. Frequent changes in the partnership of units, especially changes that are not practiced in peacetime, will produce in-efficiency, misunderstanding, and confusion. (66)

Flexibility

Flexibility is the ability of an organization to adapt to a particular situation; the degree to which its TOE organization facilitates task organization in combat. General McNair believed that flexibility and economy were essentially the same since flexibility meant freedom to use personnel and equipment where they would produce the most effective, and therefore most economical, results. This principle favors giving each command echelon the combat and service support means to reinforce its lower echelons, thus providing for economy of force and the flexibility to concentrate its combat power at the decisive point. Tactical organizations should contain the minimum essential combat power to perform their battlefield functions under normal conditions, but since combat conditions are rarely normal, organizations should anticipate entering combat as task-organized teams reinforced with attachments provided by

higher echelons. Tactical organizations organized on the combat command principle, and with sufficient organic strength, can perform countless combinations to meet practically any situation. The more the various elements of a tactical organization are fixed, or the fewer the basic elements available for task organization, the less flexible the organization becomes.

Integration with Operational Doctrine

To provide unity of effort and achieve economy of force, operational requirements must drive organizational design and force structure. Just as the ROAD concept did not support the Active Defense, Army 86 did not support AirLand Battle. As Barrett argued, current operational requirements place contradictory demands on the Army's force designers: the requirement for synchronization dictates that tactical organizations be flexible and capable of rapid task organization, and the requirement for agility dictates that tactical organizations be responsive, balanced, self-contained combined arms formations. These organizational capabilities are not easily combined in a single echelon of command. Any force design decision is bound to be a compromise solution to the problem of meeting these demands. E.S. Johnston provided a set of criteria that could help force designers determine whether a certain capability should be included organically in a unit, or placed in a higher unit where it can be made available as needed. His criteria for force design are as follows: (67)

Is the capability used with such frequency by the lower echelon as to make organic inclusion desirable?

Is it available in sufficient quantities to permit organic inclusion, or should it rather be pooled under higher echelons in order to facilitate its presence when and where most needed?

Can it be employed as effectively by the lower as by a higher echelon?

There are at least two other tests that the force designer should apply to aid in his decision. These tests are:

Does it have the same degree of mobility as the lower echelon, or will it reduce that echelon's mobility?

Can it be sustained at the lower echelon, or does it sustainment overburden that echelon with logistical and training requirements?

Standardization

Standardization is a principle that seems to be in conflict with flexiblity, but without a standardized force design, task organization becomes a complicated and time-consuming process. Fixed organizations, particularly those at battalion and company level, are the structural building blocks from which, and upon which, task forces are constructed. The requirement for standardized force design dictates that the Army retain certain fixed organizations. However, these fixed organizations must be capable of receiving and giving up attachments as necessary to facilitate task organization and thus provide organizational flexibility.

Resiliency

Resiliency is the ability of a unit to undertake continuous operations, absorb combat losses, and still remain combat effective. It requires robustness and redundancy in an organization. Force designers are again faced with a paradox. Designing staying power into an organization costs assets that could be used to activate other units, while the lack of resiliency in sustained heavy combat generates the requirement for more units to allow for unit rotation and reconstitution. Any force design decision concerning this principle will involve a compromise on how much is enough. The only apparent solution is to include in the operational concept how long, and at what intensity of combat, each unit must be able to conduct continuous operations.

Continuity

An Army should make organizational changes only if the benefits clearly outweigh the costs. Organizational stability is desirable because TOE changes mean changes in training, manpower, deployment, and material acquisition requirements. Nevertheless, TOEs are inherently unstable and subject to continual review and revision. Tactical organization has to keep abreast of recent combat experience as well as technological innovation and modifications in doctrinal employment. The TOEs of different

types of units are interdependent because units are designed to support each other; therefore change in one TOE usually leads to change in several others. In addition, every TOE represents a compromise between several conflicting requirements; there is therefore a constant tendency to amend them. The implementation of necessary changes should be evolutionary and should anticipate the introduction of new technologies, so that units can integrate the reorganization process into its other activities.

Organizational Imperatives

The principles of tactical organization lead to certain organizational imperatives that should guide the force design process. The imperatives listed below were accumulated during the course of this monograph's preparation. (68)

Economy of Force

Streamline combat units for quick, decisive action; assign to combat units only the minimum essential personnel and equipment they require at all times to conduct normal combat operations.

Pool at higher headquarters that which combat units need only occasionally; such pools not only keep personnel and equipment from idleness but also permit rapid massing for concentrated use.

Keep headquarters as small as possible, yet capable of sustained 24-hour operations.

Allot each echelon the maximum number of subdivisions, within the total desirable for its normal operations, that its typical leader will be able to handle efficiently, and that other factors will permit. The number of subordinate elements normally assigned a commander must be less than the saturation point to permit adequate control of reinforcing elements in combat.

Unity of Effort

Provide units of all arms and services at each echelon with the same degree of tactical mobility and survivability.

Provide units at each echelon with those means they habitually require to perform their mission in combat.

Integrate combined arms and essential services at the lowest echelon that can perform the integration economically -- effectively and efficiently.

Centralize continuous battle functions such as surveillance, target acquisition, suppression, counterfire, interdiction, and logistics at levels which will allow these functions to continue as required, regardless of the immediate degree of commitment of the supported force.

Centralize administrative support functions to allow lower echelon commanders to focus on tactical operations.

Flexibility

Design organizations that can be tailored at any echelon for the tactical or strategic situation and environment.

Balance the arms within an organization; combined arms organizations in which one arm dominates the others may be useful in certain circumstances, but lack flexibility.

Integration

Design organizations on the basis of their battlefield functions and the tactical doctrine for their employment.

Standardization

Design organizations at each echelon as nearly identically as possible.

Reduce, simplify, and standardize tactical, technical and training functions at all echelons, but especially at company and platoon, where the leadership is most inexperienced.

Resiliency

Design organizations for continuous combat operations by providing sufficient robustness and redundancy for uninterrupted performance of critical control functions and key combat tasks.

Continuity

Design organizations to facilitate the assimilation of new doctrine and anticipated new equipment through evolutionary transition stages.

Organizational Doctrine

The US Army does not have, but desparately needs, a formal doctrine for force design. In the place of a formal doctrine, it currently relies on individual interpretations of the McNairian folklore of streamlining and pooling. This myth has survived because the Army chose not to critically analyze the shortcomings of McNair's force design philosophy or the changes in conditions that have rendered it even more deficient today than it was at the time of its formulation. When the Army finally replaces this myth with a formal organizational doctrine, this doctrine should include the following elements:

A set of theoretical principles on which to base force design decisions. This monograph's conclusions form the basis for such a set.

A methodology for formulating operational concepts and then translating them into force design alternatives. The TRADOC concept based requirements system currently performs this function, and appears to work well, so long as the TRADOC integrating centers perform their task of insuring that the service schools design organizations that reflect the requirements of the operational concept.

An evaluation process to test operational concepts and organizational designs in the field, in order to scientifically and deliberately establish their validity before the rest of the Army transitions to them. The 1st Cavalry Division DRE and the more recent 9th Infantry Division field tests provide models for developing such a process.

A means to impose program constraints on force design without radically altering that design. This remains an unresolved issue.

UNRESOLVED ISSUES

Units of Maneuver and Concentration

One of the most significant issues facing the Army today is whether it should adopt a "skip echelon" force structure that alternates units of maneuver and units of concentration at both the tactical and operational levels. In WWII the regiment, division and field army served as fixed units of maneuver with

both tactical and administrative responsibilities, while the corps served as a flexible unit of concentration with purely tactical responsibilities. Under the initial ROAD concept, the battalion, division, and field army served as units of maneuver, while the brigade and corps served as units of concentration. The EAD Study and its consequent elimination of the tactical corps echelon blurred the function of the corps, and neither the corps nor the brigade were ever purely tactical echelons. This monograph's findings lead to the conclusion that there has never been a clear skip echelon in the US Army. The principle of economy of force favors all echelons being able to concentrate AND maneuver, to allocate resources AND to fight. The Army simply does not have the luxury to design each echelon to do one function or the other -- each echelon needs the flexibility and agility to do both.

While Barrett attempts to make the case for alternating flexibility and responsiveness [agility] in the echelons of command, he does not succeed. barrett would provide an organic brigade base, similar to the one currently found in separate combat brigades, to the divisional combat brigades, and then eliminate the division base. The Corps Support Command would then operate a forward element in the division rear area to interface with the brigades, just as the Division Support Command forward support battalions currently interface with the brigades in the brigade rear areas. An attached corps field artillery brigade would provide general support (interdiction and counterfire) to the division, just as the Division Artillery's direct support field artillery battalions currently support the brigades' close combat mission. While strongly favoring an increase in the brigade commander's degree of control over the support assets in his area, the organizational principles and imperatives discussed earlier also favor the argument that the divison commander needs the same degree of control over his support assets, and for similar reasons. Barrett's proposals leave the division commander without a credible division base to influence the decisive effort of the division -- the same position that the brigade commander has been in since the adoption of the ROAD concept! Barrett advocates the division

commander having to depend on the corps commander for the fire support means to perform his interdiction and counterfire functions; but the division commander certainly needs the same degree of control over these means as the brigade commander needs over his fire support means for close combat. In arguing his case for fixed brigades, Barrett states,

> both the maneuver and firepower elements of the force must respond to a single commander ... these complementary and supplementary functions must work in such a synchronous manner that the appearance is one of absolute unity of effort ... maneuver and firepower must be highly responsive to each other and the unitary commander ... balance is created by organizing maneuver and fire support forces into units of equal mobility, survivability, and sustainability. (69)

These criteria of mobility, survivability, and sustainability are the same ones used by McNair to make economy of force decisions in WWII, and they are still valid today for all command echelons, not just the brigade.

As E.S. Johnston noted, unity of command is merely a means to the end of unity of effort, with cooperation being another means to the same end. Perhaps Barrett's thesis understates the degree of control that brigade commanders actually have over their support assets, just as it understates the degree of control that the division commander must have over his. Divisional brigade commanders employ cooperation and coordination to exert considerable influence over their habitually associated support assets. In the tradeoff between the efficiency and flexibility of centralization and the responsiveness and cohesion of decentralization, the principle of unity of effort suggests that the brigade and the division should both have organic to them those support assets that they will normally, habitually, almost always need in combat, regardless of the mission.

One possible solution is to design flexible organizations at all levels above battalion, each echelon having a command base similar to the old ROAD division or separate brigade base, designed for normal operations, plus assets to reinforce a variable number of subordinate units when conditions become

abnormal -- which in one way or another they always are since practically no one anticipates fighting pure. Under this proposal, the brigade would look similar to the one Barrett proposes. The division would be composed of a division base and a variable number of brigades. The division base would consist of the division headquarters and headquarters company, a signal company to support division headquarters and the division base, a military police company with responsibility for the division rear area, a military intelligence company or battalion in direct support of the division headquarters, a cavalry squadron to perform division-level reconnaissance and security missions, air defense and engineer battalions with responsibility for the division rear area and for providing backup support to the brigades, and a battalion-size DISCOM to provide DS level support to the division base and CSS management to the entire division. To that division base would be assigned or attached a variable number of flexible combat and combat support brigades, each with its organic DS level support battalion. A typical division might control three ground maneuver brigades (heavy and/or light), one combat aviation brigade, and one field artillery brigade. At corps level, additional combat and combat support brigades and regiments would be available to reinforce the divisions to support the corps commander's concept of the operation, or to operate independently under corps control. A typical corps might have one heavy and one light ground maneuver brigades, one or two field artillery brigades, one combat aviation brigade, and an armored cavalry regiment, in addition to those brigades normally attached to its subordinate divisions. In the COSCOM would be a general support base and a variable number of flexible forward support brigades, each capable of providing area support (to include backup DS level support, a function now performed by the DISCOM main support battalion) to the forward divisions. Just as the division commander now task organizes his brigades, the corps commander would be able to task organize his divisions, by attaching and detaching combat, combat support and combat service support brigades, groups, and battalions.

An alternative solution is to redefine the US Army's terms for command/support relationships. If the Direct Support mission were defined to include automatic operational control of the supporting unit by the supported unit, for all branches, Army-wide, and if habitual association flourished in peacetime at brigade level and above, the Army's agility would improve overnight, without a loss in organizational flexibility.

Echelons Above Division

The US Army has not yet begun to grapple with the organizational implications of its evolving operational concept for the reintroduction of the tactical corps and operational echelons above corps. Current initiatives focus on unwieldy corps attempting to train for field army missions, under severe manpower and equipment constraints that cause the Army to design austere divisions and to place essential elements of combat power in the reserve components. This may reflect political reality within NATO, but there is no reason to tie the rest of the Army to the NATO system. In Southwest Asia or other contingency areas, the US Army could establish an operational-level field army on the model of WWII and Korea, with two or more tactical-level corps to control the divisions and to provide user-oriented battlefield combat support and combat service support, and a Field Army Support Command to manage the combat zone General Support logistic base on an area basis. A future study should compare and contrast the two systems, using WWII combat examples to provide the evidence.

Force Design versus Force Structure

The fundamental problem of the Army of Excellence is that its organizational emphasis on austerity and flexibility conflicts with the Army's new operational emphasis on agility and responsiveness. Before AOE, force design was relatively unconstrained by force structure or manpower considerations. This was particularly true during the DRS and the Army 86 studies. Under AOE, however, program constraints drive organization, impacting on doctrinal requirements and even on the operational concepts upon which our doctrine is based. (70) The Army will have to come to grips with this conflict between operational doctrine and tactical organization. Combat

effectiveness on tomorrow's battlefield will be very inefficient in terms of resource management. The economic expenditure of combat power will involve what the managers of national resources perceive to be inefficiency. But war is not a commercial business -- the rules are different and the consequences of failure are much greater. The Army's force design should clearly demonstrate the Army's total force requirements, so that both Congress and the American people can see what they are buying and where they are taking risk. Professional soldiers understand unfunded TOE requirements in peacetime, because they can anticipate that Congress will fund these requirements in wartime; they have a harder time understanding their military leaders not recognizing a valid TOE operational requirement. Moreover, as the baton is passed from generation to generation, the Army tends to forget why the requirement is undocumented or even that it is needed at all. There is no sense in using faulty force design to trick ourselves into having more force structure than the Army program will support. Let Congress know the shortfall and the risk associated with that shortfall. The Army has paid lip service for too long to the timeless principle elaborated by E.S. Johnston almost fifty years ago -- an army must adjust its means to its ends, or its ends to its means, or it will surely face defeat.

END NOTES

1. US Army Combined Arms Combat Development Activity, Field Circular 100-1, The Army of Excellence (Fort Leavenworth, Kansas: US Army Combined Arms Combat Development Activity, 1 September 1984), p A-1, and personal interview with Mr Robert Keller, Deputy Director, Force Design Directorate, USA CACDA, 17 September 1985).

2. Maj E.S. Johnston, "Field Service Regulations of the Future", Review of Military Literature (June 1936), p 31 (hereafter Johnston (June 1936)).

3. Maj E.S. Johnston, "A Science of War", Review of Military Literature (June 1934), p 116 (hereafter Johnston (June 1934)).

4. Maj E.S. Johnston, "Field Service Regulations of the Future", Review of Military Literature (September 1936), pp 25-26 (hereafter Johnston (September 1936)).

5. Johnston (June 1934), p 117.

6. Johnston (September 1936), p 29.

7. Johnston (June 1936), p 26.

8. J.F.C. Fuller, The Foundations of the Science of War (London: Hutchinson & Co, 1926), p 202.

9. US Army Command and General Staff College, Field Manual 100-5, Operations (Draft) (Fort Leavenworth, Kansas: US Army Command and General Staff College, 27 June 1985), p B-4.

10. Johnston (September 1936), pp 29-33.

11. Ibid, p 33.

12. Ibid, pp 33-34.

13. Kent Roberts Greenfield, Robert R. Palmer, and Bell I. Wiley, The Organization of Ground Combat Troops (United States Army in World War II series) (Washington, DC: GPO, 1947), p 291 (hereafter Palmer).

14. John K. Mahon and Romana Danysh, INFANTRY, Part I: Regular Army (Army Lineage Series) (Washington, D.C.: GPO, 1972), p 58.

15. Palmer, pp 292-293.

16. Ibid, p 280.

17. Ibid, p 293.

18. Ibid, p 276.

19. See Jonathan M. House, Toward Combined Arms Warfare: A Survey of 20th-Century Tactics, Doctrine, and Organization (Fort Leavenworth, Kansas: US Army Command and General Staff College, August 1984), p 4 (hereafter House). House divides the concept of combined arms into two procedures: supplementary or reinforcing combined arms, and complementary combined arms. Supplementary combined arms increase the effect of one weapon system or arm with the similar effects of other weapons and arms, while complementary combined arms combine the different effects of different weapon systems and arms in order to obtain a synergistic effect that is greater than the sum of its parts.

20. Palmer, pp 295-296.

21. Ibid, p 281.

22. Ibid, p 287.

23. Ibid, pp 297-299.

24. Ibid, pp 297-299.

25. Ibid, p 372.

26. Ibid, p 373.

27. House, p 107.

28. Kenneth T. Sawyer, "A Universal Division" (Carlisle Barracks, Pennsylvania: US Army War College, 25 January 1960), p 34.

29. House, p 154.

30. Maj Robert A. Doughty, The Evolution of US Army Tactical Doctrine, 1946-76 (Fort Leavenworth, Kansas: US Army Command and General Staff College, August 1979), p16.

31. US Continental Army Command, HQ CONARC Letter, SUBJECT: Studies Relating to Future Concepts, dated 24 April 1956.

32. Inclosure 1 (Factors Determining Optimum Division Size)to US Army Command and General Staff College CDD Study 56-10, "Implications of Small Divisions" (Fort Leavenworth, Kansas: US Army Command and General Staff College, 28 June 1956), p 1 (hereafter Incl 1 to CGSC CDD Study 56-10).

33. CGSC Study 56-10, pp 2-4.

34. Annex A (Discussion) to Incl 1 to CGSC Study 56-10, pp 6-9.

35. Ibid, p 10.

36. Ibid, p 5.

37. House, p 155.

38. Annex A (Discussion) to Incl 1 to CGSC Study 56-10, p 12.

39. House, p 160.

40. John L. Romjue, Division 86: The Development of the Heavy Division (Volume I of 2-volume A History of Army 86)(Fort Monroe, Virginia: US Army Training and Doctrine Command, June 1982), p 1 (hereafter Romjue I).

41. Personal interview with Mr Robert Keller, 17 September 1985; see also US Army Training and Doctrine Command's Division Restructuring Study, Phase I Report, Vol I: Executive Summary (Fort Monroe, Virginia: US Army Training and Doctrine Command, 1 March 1977) and Romjue I, pp 9-13 and 42-44.

42. Romjue I, pp 12 and 15.

43. John L. Romjue, The Development of the Light Division, the Corps, and Echelons Above Corps (Volume II of 2-volume A History of Army 86)(Fort Monroe, Virginia: US Army Training and Doctrine Command, December 1981), p 115 (herafter Romjue II).

44. Romjue I, pp 21 and 66-68.

45. Romjue I, p 17. General Starry's approach was institutionalized as the TRADOC Concept Based Requirements System. TRADOC develops operational concepts that describe what combat and support functions the Army requires in combat. These operational concepts serve as guidelines for developing operational doctrine, which prescribes how the Army will perform those functions, as well as for developing organizational capabilities through force design and force structuring.

46. Romjue I, pp 101 and 106.

47. Ibid, p vi.

48. Romjue II, p 47.

49. Ibid.

50. Romjue II, p 51.

51. Ibid, p 55.

52. US Army Combined Arms Combat Development Activity, Field Circular 100-1, The Army of Excellence (Fort Leavenworth, Kansas: US Army Combined Arms Combat Development Activity, 1 September 1984), p 1-3 (hereafter FC 100-1).

53. Ibid, p 4-1.

54. Ibid, p 1-3.

55. Ibid, p 1-4.

56. Major Raymond D.Barrett, MMAS thesis, "Coherence Between AirLand Battle and Contemporary Force Structure at Corps, Division and Brigade Level" (Fort Leavenworth, Kansas: US Army Command and General Staff College, 1985), p 47 (hereafter Barrett).

57. FC 100-1, p 5-1.

58. Maj Gen "Sam Damon" and Brig Gen "Ben Krisler", "Army of Excellence? A Time to Take Stock", Armed Forces Journal International (May 1985), pp 92 and 94.

59. Brig Gen John C. Bahnsen, "The Kaleidoscope Army", Armed Forces Journal International (November 1985), pp 82 and 84.

60. Barrett, pp 62-63.

61. Ibid, p 63.

62. Ibid, p 85.

63. Ibid, p 100.

64. Palmer, pp 290-291.

65. Johnston (June 1936), p 26.

66. House, p 188.

67. Johnston (September 1936), pp 32-33.

68. These organizational imperatives are taken from General McNair's guidelines to achieve economy of force (see Palmer, p 273 and House, pp 105-106 and 184); from unclassified charts contained in Annex C (Organizational Principles) to US Continental Army Command, Reorganization Objective Army Divisions 1965 (ROAD 1965)(U) (Fort Monroe, Virginia: US Continental Army Command, 1 March 1961) (CONFIDENTIAL); and from General Starry's "Principles of Force Structuring Applicable to Combat Unit Design in Division 86" (see Romjue I, pp 66-68).

69. Barrett, p 65.

70. Lecture presented by Mr. Robert Keller, 25 September 1985.

BIBLIOGRAPHY

Books

Doughty, Robert A. Leavenworth Paper No 1, The Evolution of US Army Tactical Doctrine, 1946-1976 (Fort Leavenworth, Kansas: US Army Command and General Staff College, August 1979).

Fuller, J.F.C. The Foundations of the Science of War (London: Hutchinson & Co, 1926).

Greenfield, Kent Roberts, Robert R. Palmer, and Bell I. Wiley. The Organization of Ground Combat Troops (United States Army in World War II series) (Washington, DC: GPO, 1947).

House, Jonathan M. Toward Combined Arms Warfare: A Survey of 20th-Century Tactics, Doctrine, and Organization (Fort Leavenworth, Kansas: US Army Command and General Staff College, August 1984).

Mahon, John K. and Romana Danysh, INFANTRY, Part I: Regular Army (Army Lineage Series) (Washington, D.C.: GPO, 1972).

Romjue, John L. Division 86: The Development of the Heavy Division (Volume I of 2-volume A History of Army 86)(Fort Monroe, Virginia: US Army Training and Doctrine Command, June 1982).

_____. The Development of the Light Division, the Corps, and Echelons Above Corps (Volume II of 2-volume A History of Army 86)(Fort Monroe, Virginia: US Army Training and Doctrine Command, December 1981).

_____. From Active Defense to AirLand Battle (Fort Monroe, Virginia: US Army Training and Doctrine Command Historical Office, June 1984).

Periodicals

Bahnsen, Brig Gen John C. "The Kaleidoscope Army", Armed Forces Journal International (November 1985), pp 78-88.

Binkley, First Lt John C. "A History of US Army Force Structuring", Military Review (February 1977), pp 67-82.

Brown, Lt Col William A. "DEORGANIZATION, or, Putting Some Stretch in the Span of Control", ARMY (April 1965), pp 61-63.

Damon, Maj Gen Sam, and Brig Gen Ben Krisler. "Army of Excellence? A Time to Take Stock", Armed Forces Journal International (May 1985), pp 86- 94.

Johnston, Maj E.S. "A Science of War", Review of Military Literature (June 1934), pp 89-140.

_____. "Field Service Regulations of the Future", Review of Military Literature (June 1936), pp 5-51 and (September 1936), pp 13-49.

Metcalf, Col George T. "The MOMAR Field Army," Army (September 1960), pp 55-59.

Wermuth, Col Anthony L. "High on the ROAD," ARMY (November 1963), pp 39-43.

Zierdt, Lt Col William H. "the structure of the new army divisions," ARMY (July 1961), pp 49-52.

Official Documents and Unpublished Papers

Barrett, Maj Raymond D. MMAS Thesis, "Coherence Between AirLand Battle and Contemporary Force Structure at Corps, Division and Brigade Level" (Fort Leavenworth, Kansas: US Army Command and General Staff College, 1985).

Brudvig, Lt Col Dale K. "The Brigade With Or Without Combat Support and Combat Service Support" (Carlisle Barracks, Pennsylvania: US Army War College, 28 May 1976.

Headquarters, Department of the Army. Department of the Army Staff Analysis of the USACDC Echelons Above Division Study, undated (circa 1970).

_____. Assistant Chief of Staff for Force Development Staff Study, SUBJECT: Echelons above Division (EAD) Study, dated 18 January 1971.

Sawyer, Lt Col Kenneth T. "A Universal Division" (Carlisle Barracks, Pennsylvania: US Army War College, 25 January 1960).

US Army Combat Developments Command. Echelons Above Division Study (Fort Leavenworth, Kansas: Institute for Combined Arms and Support, February 1970).

_____. "Guidelines for the Development of Basis Of Issue Plans, Manpower Authorization Criteria, Tables of Organization and Equipment", undated (circa 1972).

US Army Combined Arms Combat Development Activity. The Army of Excellence Final Report, Volume III: The Heavy Division (Fort Leavenworth, Kansas: US Army Combined Arms Combat Development Activity, 1 October 1984).

_____. Division 86 Final Report (Fort Leavenworth, Kansas: US Army Combined Arms Center, October 1981).

_____. Field Circular 100-1, The Army of Excellence (Fort Leavenworth, Kansas: US Army Combined Arms Combat Development Activity, 1 September 1984).

US Army Command and General Staff College. 2 Command Class Study, "Task Force Grouping vs Fixed Strength Units", undated (1946).

_____. Study, "Optimum Organization of US Army Divisions in 1960" (Fort Leavenworth, Kansas: US Army Command and General Staff College, 26 February 1954).

_____. CDD Study 56-10, "Implications of Small Divisions" (Fort Leavenworth, Kansas: US Army Command and General Staff College, 28 June 1956).

_____. Field Manual 100-5, Operations (Draft) (Fort Leavenworth, Kansas: US Army Command and General Staff College, 27 June 1985).

_____. Reference Book 20-18, Selected Readings in Military History: Evolution of Combined Arms Warfare (Fort Leavenworth, Kansas: US Army Command and General Staff College, September 1983).

US Army Concepts Analysis Agency. CONAF Technical Paper 2-73, Definition and Use of Combat Modules (Bethesda, Maryland: US Army Concept Analysis Agency, 21 June 1973).

US Army Training and Doctrine Command. Division Restructuring Study, Phase I Report, Vol I: Executive Summary (Fort Monroe, Virginia: US Army Training and Doctrine Command, 1 March 1977).

_____. TRADOC Regulation 11-7, Operational Concepts and Army Doctrine (Fort Monroe, Virginia: US Army Training and Doctrine Command, 16 July 1982).

_____. TRADOC Supplement 1 to AR 310-31, Management System for Tables of Organization and Equipment (The TOE System) (Fort Monroe, Virginia: US Army Training and Doctrine Command, 22 July 1975).

US Continental Army Command. HQ CONARC (ATSWD-G461) Letter, SUBJECT: Studies Relating to Future Concepts, dated 24 April 1956.

_____. Reorganization Objective Army Divisions 1965 (ROAD 1965) (U) (Fort Monroe, Virginia: US Continental Army Command, 1 March 1961). (CONFIDENTIAL).